

An Inventory of My Traits

Abstract

Students take an inventory of their own easily-observable genetic traits. Working in small groups, they observe how their trait inventories differ from those of others. Students record their observations in a data table and make a bar graph to show the most and least common traits in the group.

Logistics

Time Required

▶ **Class Time:**
30 minutes

▶ **Prep Time:**
20 minutes to review activity and make copies of student pages

Materials

Copies of student pages

Prior Knowledge Needed

How to construct and read bar graphs

Appropriate For:

Ages: 10 - 13
USA grades: 5 - 7

Learning Objectives

- ▶ Traits are observable characteristics that are passed down from parent to child.
- ▶ An individual will have many traits they share in common with others.
- ▶ An individual's overall combination of traits makes them unique.
- ▶ Some traits are more common in a population than others.

Special Features You'll Find Inside

- ▶ Includes a fun optional activity in which students predict the number of traits it will take to distinguish a student volunteer from everyone else in the class.
- ▶ Includes a math extension in which students calculate the frequency of traits in their classroom, then compare their calculations with given frequencies for the general population.

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Classroom Implementation

Activity instructions:

- Begin by demonstrating one of the traits listed in *An Inventory of My Traits: Survey* (page S-1). Ask students who possess this trait to stand. Point out the relative numbers of students standing and sitting for the trait. Continue this process with 2-3 more traits.
- Explain that traits are observable characteristics we inherit from our parents. Some traits are common in a population (our class) while others are not. And, every person has a different overall combination of traits that makes them unique.
- Divide students into groups of four or more. Have each student in the group complete *An Inventory of My Traits: Survey* (page S-1) to determine their unique combination of the traits described.
- After students complete the survey, have them tally their group information on the data table (page S-2) and draw a bar graph (page S-3).
- *Optional:* You may collect the traits data from the whole class by creating a large wall chart. Have a representative from each group fill in their data. Once all the data has been collected, have the students make a bar graph from the class data or make one large graph together.

Optional activity:

- Ask students to predict how many traits they would have to look at on the *Survey* in order to identify any given classmate as unique.
- Select a volunteer who would like to determine his or her uniqueness. Ask all students to stand.
- Have the volunteer call out one of their traits at a time, beginning with question 1 on the *Survey* and continuing in sequence. For each trait, direct all students who do not share that trait to sit down; students who share the trait remain standing. Once a student sits down, they do not get up again.
- Continue in this way until the volunteer is the only one standing. Count the number of traits it took to distinguish the volunteer from everyone else in the class. Compare this number with the students' predictions.
- Repeat with several additional volunteers.

Quantities

Per Student

- ▶ One copy of student pages S-1 to S-3

Common Misconceptions

Students may think that the more common traits are “better”, but this is not always the case. Sometimes traits simply show up more frequently in the human population.

More advanced students may think that dominant traits are more common than recessive traits. However, frequency has very little to do with whether a trait is dominant or recessive. That is, a dominant trait is not necessarily more common and a recessive trait is not necessarily rare in a population.

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Math extension:

- Have students calculate the frequency of the following traits in their classroom: tongue rolling, handedness and hand clasping. Create a frequency table by having students place tally marks for each of the three traits.

Example: Observable Trait Number of Students with Trait

Can roll tongue	///// ///// /////
Cannot roll tongue	///// /

- Calculate the frequency of each trait. Students can then compare their calculated frequencies with those for the general population (provided in the table below).

Example: # of students with the trait/# of students in the class x 100 = _____%

 5 tongue rollers / 21 students in the class x 100 = 71%

Trait	Frequency in General Population *
<i>Tongue rolling</i>	Can roll tongue – 70% Cannot roll tongue – 30%
<i>Handedness</i>	Right handed – 93% Left handed – 7%
<i>Hand clasping</i>	Left thumb on top – 55% Right thumb on top – 44% No preference – 1%

*Frequencies for traits are from Online Mendelian Inheritance In Man (see <http://www.ncbi.nlm.nih.gov/omim/>).

Standards

U.S. National Science Education Standards

Grades 5-8:

Content Standard C: Life Science - Reproduction and Heredity

- Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.
- The characteristics of an organism can be described in terms of a combination of traits.

AAAS Benchmarks for Science Literacy

Grades 3-5:

The Living Environment: Heredity - Some likenesses between children and parents, such as eye color in human

Additional Resources

Visit the **Learn.Genetics** website to get links to great resources like these! Just log-in as a teacher and click on **The Basics and Beyond**.

- Tour of the Basics:** An animated tutorial that contains background information on DNA, genes, patterns of inheritance and more!
- Inherited Human Traits: A Quick Reference:** A pictorial reference and description of inheritance, and inheritance patterns (dominant, recessive, sex-linked, polygenic) for several human traits, including those listed in this activity.

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beings, or fruit or flower color in plants, are inherited. Other likenesses, such as people's table manners or carpentry skills, are learned.

For offspring to resemble their parents, there must be a reliable way to transfer information from one generation to the next.

Credits

Activity created by:

Molly Malone, Genetic Science Learning Center

April Mitchell, Genetic Science Learning Center

Louisa Stark, Genetic Science Learning Center

Harmony Starr, Genetic Science Learning Center (illustrations)

This activity was adapted from: "Alike But Not The Same" in Human Genetic Variation, NIH Curriculum Supplement Series (1999). Available at <http://science-education.nih.gov/customers.nsf/highschool.htm>.

Name _____

Date _____

An Inventory of My Traits - Survey

What combination of these traits do you have? Complete the survey to find out.

- | | | |
|---|-------------------------------|---------------------------------|
| 1. I have detached earlobes | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. I can roll my tongue | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. I have dimples | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. I am right-handed | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. I have freckles | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. I have naturally curly hair | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 7. I have a cleft chin | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 8. I have allergies | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 9. I cross my left thumb over my
right when I clasp my hands
together | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 10. I can see the colors red and green
(I am not color blind) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 11. The hairline on my forehead is
straight. | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 12. I am a: | <input type="checkbox"/> Male | <input type="checkbox"/> Female |

Adapted from "Alike But Not The Same" in Human Genetic Variation, NIH Curriculum Supplement Series 1999. <http://science-education.nih.gov>

Name _____

Date _____

An Inventory of My Traits - Data Table

How many people in your group have each trait?
Fill in the data table below by counting the number of people who marked “yes” and the number of people who marked “no” for each trait.

TRAIT	YES	NO
Detached earlobes		
Tongue rolling		
Dimples		
Right-handed		
Freckles		
Naturally curly hair		
Cleft chin		
Allergies		
Cross left thumb over right		
See the colors red and green		
Have a straight hairline		

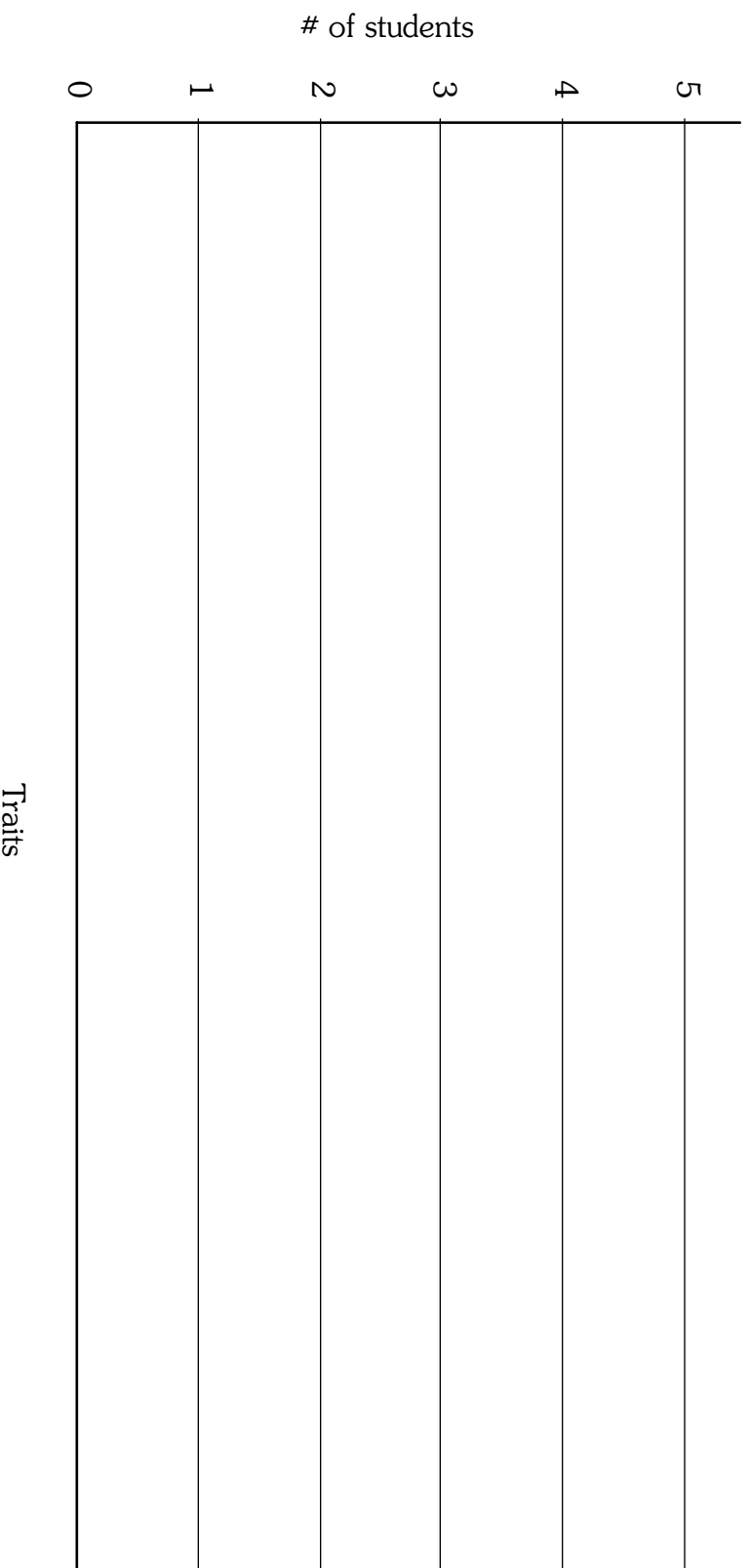
Adapted from “Alike But Not The Same” in Human Genetic Variation, NIH Curriculum Supplement Series 1999. <http://science-education.nih.gov>

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An Inventory of My Traits - Graph

Make a bar graph showing how many people in your group answered “yes” for each trait.
Be sure to label each trait under the bar you draw for it.



Name _____

Date _____

Un Inventario de mis Rasgos - Encuesta

¿Quales son los rasgos que tú tienes que se le hacen singular?
Para averiguar, completa la encuesta que sigue abajo.

- | | | | |
|-----|--|---------------------------------|--------------------------------|
| 1. | Tengo los lóbulos de las orejas separados | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 2. | Puedo hacer rollito mi lengua | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 3. | Tengo hoyuelos | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 4. | Escribo con la mano derecha | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 5. | Tengo pecas | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 6. | Mi cabello es rizado por naturaleza | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 7. | Tengo la barbilla partida | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 8. | Tengo alergias | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 9. | Cuando entrelazo mis dedos pongo mi pulgar izquierdo sobre mi pulgar derecho | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 10. | Puedo ver los colores rojo y verde
(No soy daltónico) | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 11. | La rayita en mi frente es recta | <input type="checkbox"/> Si | <input type="checkbox"/> No |
| 12. | Yo soy: | <input type="checkbox"/> Hombre | <input type="checkbox"/> Mujer |

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Date _____

Un Inventario de mis Rasgos - Tabla de Datos

¿Cuántas personas de tú grupo tienen cada rasgo?

Completa la tabla de datos que aparece a continuación contando el número de personas que marcaron “Si” y el número de personas que marcaron “No” en cada rasgo.

RASGO	SI	NO
Lóbulos de las orejas unidos		
Puede hacer rollito la lengua		
Hoyuelos		
Escribe con la mano derecha		
Pecas		
Cabello rizado natural		
Barba partida		
Alergia		
Cruza el pulgar izquierdo sobre el derecho		
Puede ver los colores rojo y verde		
Tenga una rayita recta		

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Name _____

Date _____

Un Inventario de mis Rasgos Gráfica

Haz una gráfica de líneas mostrando cuántas personas en tu grupo contestaron “Si” en cada rasgo. Asegúrate de marcar cada barra con el nombre del rasgo que estás dibujando.

